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I

STATUS OF THE MIND PROBLEM

BY

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## STATUS OF THE MIND PROBLEM.\*

By LESTER F. WARD.

There is a revival of interest in the study of the mind. A revival, I say, because it would seem that for nearly half a century the world had dropped the study of mind, and devoted itself to the study of life. For all the centuries that preceded the scientific era, mind was almost the only subject that engaged the attention of thinking men. Not to speak of the ancients or of medieval writers, the seventeenth century was the age of Hobbes, Descartes, Spinoza, Locke, and Leibnitz, while the eighteenth was that of Berkeley, Hume, Reid, and Kant. The German and Scottish schools, under the lead of Fichte, Hegel, and Schopenhauer, and of Stewart, Brown, and Hamilton, witnessed the ebb of the great psychic tide during the first third of our own century; and although the last-named of these great metaphysicians had for his motto the words, "On earth there is nothing great but man, in man there is nothing great but mind," he was unable to prevent the world from plunging enthusiastically into the almost exclusive study of the animal and of matter. Metaphysics was abandoned, and henceforth whatever attention was given to mind was applied to its physiological side and named *psychology*. But, as already remarked, the thought of mankind has for the past fifty years been chiefly concentrated upon the problems of biology. That domain has been immeasurably enriched. First the forms of life were marshaled and scientifically classified, then the laws of their development were worked out, and finally their tissues claimed attention, as made up of various arrangements of the universal biological unit, the cell. And now it would seem that even the histological stage is past, and thought is being centered on the constitution of the cell itself—especially of the germ cell, and biologists are deep in the problem of the ultimate physiological unit or bearer of hereditary tendencies—call it *gemmule*, *plastidule*, *biophor*, or what not—in short the problem of heredity.

But in the midst of this mad strife to compass the solution of the life problem the world has, as it were, unintentionally, and in spite of itself, again encountered the mind problem. It has discovered *protoplasm*, "the physical basis of life," and learned that this is the essential constituent of nerve tissue, the physiological basis of mind. It

\* A Saturday lecture delivered in the lecture-hall of the U. S. National Museum, under the auspices of the Anthropological Society of Washington.

Spec. Pap. A. S. W., vol I.—No. 1.

has found the point to which life and mind converge, or rather, from which they diverge, and thus laid the foundation for a study of mind as a natural outgrowth of a knowledge of the body. This method of investigating the mind is as hopeful as the old metaphysical method, which contemplated it as an uncaused and foundationless entity, was hopeless, and it is obviously this hopefulness which has produced the modern revival of interest in the study of mind of which I have spoken. As a matter of fact, we have already a large and fully equipped school of experimental psychology, and there is probably no department of science to-day in which more rapid progress in the knowledge of phenomena and laws is being made. We are, it is true, still in the primary stage of observation, experimentation, and accumulation of facts, but the broader minds are already at work upon the results, and there is great promise for the future of the science of mind.

It is not my purpose to attempt any enumeration of the substantial gains to psychology that have resulted from the modern method of study, much less to set forth the nature of these methods. Both of these classes of information are accessible to those who take the trouble to scan the rapidly growing literature of the science. The task I have set myself is a much simpler one, but nevertheless one which is attended with difficulties—the task, namely, of stating the general problem, which, as it seems to me, our present knowledge of the mind presents for solution. This problem involves the two questions: What is mind? and, Whence comes it?—the nature and the origin of the mind.

The older philosophies restricted the notion of mind to what we now designate as the intellect, or at most to the intellect and the senses, by means of which it was seen to communicate with the outside world. The feelings were not supposed to be any part of the mind. Certain authors, notably Spinoza, treated the affections exhaustively, but not as a preparation for the study of mind. These and the will were considered in connection with the study of ethics. By most authors the emotions and passions were looked upon as something bad, to be restrained or suppressed, while the will was invested with divine attributes, that is, with original or underived powers. There was no lack of treatises on the soul, but neither was this regarded as any part of mind. It was independent of both mind and body, and always figured in the domain of religion.

Modern psychology, as we have seen, connects the mind with the body, but it also expands the conception of mind so as to include the feelings, the will, and also the soul. A common order of treatment is to unite the senses and the intellect into one great group of psychic phenomena, and the emotions and the will into another. Even this may be shown to be illogical, and it is beginning to be recognized that the mind has no distinct departments or faculties, but is one complex group of connected phenomena. And, curiously enough, all attempts to find a single principle or ultimate fact underlying and characterizing the



entire product have led in the direction of feeling and not of thought as the real basis of the mind. Indeed, it is now boldly maintained that thought itself, and every state of consciousness, is a feeling. 'And yet I think it can be successfully contended, theoretically at least, that sensation and perception are distinct things; that feeling and thought are in a sense the opposites of each other, not, indeed, independent, but, as it were, the obverse and reverse of one and the same coin. We can abstract the sensation in many cases from the knowledge that it gives, and we can and habitually do ignore the feeling and attend solely to the thought. Still, feeling is the primary fact, and no attempt to arrive at the nature of mind can succeed through the study of thought alone.

In predicating the dependence of mind and body, one of the first precautions to be taken is that against predicating their identity. That every mental fact corresponds to a physiological fact as its antecedent, or at least its necessary concomitant, is now a generally accepted truth. There is not a psychologist nor a physiologist who holds that the mental fact and the physiological fact are one and the same thing. The question as to the exact nature of the connection between these two facts may be regarded as the leading problem of psychology to-day. It is therefore fitting that I should offer a few thoughts on this problem.

We are constantly hearing about the "mystery of mind," and when we inquire closely what this means we usually find that it is just this question of the real relation of mind to body. All admit that there is no resemblance between mind and body, and it is the overwhelming consensus of opinion that the connection between them is utterly inexplicable. I shall not refer to those authors who look upon the body as something essentially base, and despise matter. I shall confine myself to an exposition of the views of men who have devoted their lives to the study of matter, either in the inorganic world or as organized in the bodies of living organisms, and who have taught us the dignity and purity, I had almost said, the divinity, of the material world. Said Prof. Tyndall:

"The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought, and a definite molecular action in the brain occur simultaneously; we do not possess the intellectual organ, nor apparently any rudiment of the organ, which would enable us to pass by a process of reasoning, from the one phenomenon to the other."\*

Mr. Herbert Spencer is on record in many forcible passages. He says:

"Though accumulated observations and experiments have led us by a very indirect series of inferences to the belief that mind and nervous action are the subjective and objective faces of the same thing, we re-

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\* *Report Brit. Assoc. Adv. Sci.*, Part II, Transactions, p. 5. Presidential address before Section of Mathematics and Physics, of the British Association for the Advancement of Science; Norwich meeting, 1868.

main utterly incapable of seeing, and even of imagining, how the two are related. Mind still continues to us a something without any kinship to other things; and from the science which discovers by introspection the laws of this something, there is no passage by transitional steps to the sciences which discover the laws of these other things.”\*

And again:

“Can the oscillation of a molecule be represented in consciousness side by side with a nervous shock, and the two be recognized as one? No effort enables us to assimilate them.”†

Prof. Joseph LeConte holds views equally pronounced:

“I know,” he says, “that much, very much, has been done recently which to many seems to identify psychology with brain physiology, and mental and moral phenomena with brain changes; and that much more will be done in the same direction. But when all is done,—all and more than we can possibly now imagine, we shall be no nearer the solution of the mystery of the relation of brain changes to mental phenomena than we are now. It is not a mystery which lessens, but only increases with knowledge. I do not hesitate to say that with an absolutely perfect science it would still be there, or even come out in still sharper relief. A vibratory thrill passes along a nerve-fiber, brain atoms are agitated by certain vibrations or oxidations, or what not—and, lo! there appear consciousness, thought, emotion. Aladdin’s lamp is rubbed, and, lo! the Genii appear. There is just as much comprehensible causal relation between the two sets of phenomena in the one case as in the other.”‡

Prof. Ladd, in his *Physiological Psychology*,§ treating of memory, remarks:

“In the study of perception psycho-physics *can* do much towards a scientific explanation. - - - But for that spiritual activity which actually *puts together* in consciousness the sensations, it can not even suggest the beginning of physical explanation. Moreover, no cerebral process can be conceived of, which—in case it were known to exist—could possibly be regarded as a fitting physical basis for this unifying *actus* of mind. Thus also, and even more emphatically, must we insist upon the complete inability of physiology to suggest an explanation for conscious memory. - - - It is this peculiar claim in consciousness which constitutes the *essence* of an act of memory; it is this which makes the memory wholly inexplicable as a mere persistence or recurrence of similar impressions. It is this which makes conscious memory a spiritual phenomenon, the explanation of which, as arising out of nervous processes and conditions, is not simply undiscovered in fact, but utterly incapable of approach by the imagination. When, then, we speak of a physical basis of memory, recognition must be made of the

\* *Principles of Psychology*: sec. 56. Am. Ed., 1873, vol. I, p. 140.

† *Ibid*: sec. 62. Vol. I, p. 158.

‡ “Relation of Biology to Sociology,” p. 4. (Reprint from *The Berkeleyan* for May, 1887, vol XXIII, p. 123.

§ Part II, chap. X, sec. 23; pp. 556, 558.



complete inability of science to suggest any physical process which can be conceived of as correlated with that peculiar and mysterious *actus* of the mind, connecting its present and its past, which constitutes the essence of memory."

Finally, Prof. William James, in his great work on the Principles of Psychology, rings new changes on this widely accepted doctrine of the mystery of mind:

"Everyone admits" he says "the entire incommensurability of feeling as such with material motion as such. 'A motion became a feeling!'—no phrase that our lips can frame is so devoid of apprehensible meaning. Accordingly, even the vaguest of evolutionary enthusiasts, when deliberately comparing material with mental facts, have been as forward as any one else to emphasize the 'chasm' between the inner and the outer worlds."\*

And after a long discussion of all the possible theories of the connection between mind and body, he concludes:

"I confess, therefore, that to posit a soul influenced in some mysterious way by the brain-states and responding to them by conscious affections of its own, seems to me the line of least logical resistance, so far as we yet have attained. . . . We must . . . ask ourselves whether, after all, the ascertainment of a blank unmeditated correspondence, term for term, of the succession of states of consciousness with the succession of total brain-processes, be not the simplest psychophysic formula, and the last word of a psychology which contents itself with verifiable laws, and seeks only to be clear, and to avoid unsafe hypotheses."†

These expressions may be taken as furnishing a fairly correct idea of the prevailing sentiment among those most entitled to be heard upon the relations between physiological processes in the nervous system and states of consciousness in the mind, or as Prof. Huxley has put it, between *neurosis* and *psychosis*. It would of course, be hopeless, even were any one so disposed, to attempt to stem such an irresistible tide of opinion. Such an attempt is very far from being my purpose, and no one is more free than I am to admit the essential mystery of mind. I propose simply to call in question, first the *necessity*, and secondly, the *propriety*, of emphasizing in such a vehement, and I might also say, gratuitous manner the fact that we are, and perhaps must always remain, profoundly ignorant of the primary and essential nature of mind.

First, then, as to the necessity for the constant and repeated confession of this ignorance. As it comes so largely from men who are dealing directly with one or another aspect of the material world it is calculated to produce upon the rest of mankind the impression that they are afraid of the charge of materialism, and are trying to atone in this way for the sin of devoting their lives to the study of matter,

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\* Principles of Psychology, vol. 1, p. 146.

† *Ibid.*, vol. 1, pp. 181, 182.

the investigation of physical phenomena and the tissues of the animal body. The way in which physicists and anatomists vie with metaphysicians and theologians in repelling even the imaginary insinuation that they accept the theory of a direct connection of mind with body suggests a feeling on their part that the latter are right in ascribing to matter and the flesh qualities that are low, earthy and base. Notwithstanding the fact that anatomists, histologists, and especially the students of the brain and nervous system have brought to light the wonderful complexity, beauty, and perfection of the animal body, and shown to what extraordinary degrees of development and refinement organization is capable of raising the materials with which it deals, there is still manifested an abhorrence at the idea that so astonishing an organ as the brain can even be the *cause* of feeling and thought. The most that will be admitted is that the latter are in some "mysterious" way correlated with the former, that they are their regular concomitants, that there is some preëstablished, or at least, unexplained and unexplainable harmony between them. Prof. James, as we have seen, is loth to go even this far, and contents himself with predicating, in the most purely positivistic way, a "blank unmediated correspondence, term for term, of the succession of states of consciousness with the succession of total brain-processes."

Although no one supposes that there is any resemblance whatever between a state of consciousness and a brain process, all admit that the latter accompanies and corresponds to the former. Few will go so far as to concede a difference of time in the sense that would make the one the antecedent of the other, but some, like Mr. Spencer, maintain that they are the opposite sides, the subjective and objective correlates, of one and the same phenomenon. We are strongly reminded of the time when men's attention was chiefly drawn to the discussion of the question how the mind was related to the external world, all denying that there was any resemblance between the real world and the world which the mind perceives, and many insisting that there was no relation whatever between them. Some denied the existence of an external world altogether and held that everything was subjective, or wholly in the mind; while others went further and more logically denied the existence of the mind also, and arrived at pure nihilism. Finally Leibnitz brought forward his theory of the existence of both the self and the not-self which were wholly unlike and unrelated, but brought into perfect correspondence, such as they seemed to possess, by a supernatural agency at work from the beginning and resulting in a "preëstablished harmony." Unsatisfactory as such a doctrine now seems, it was widely accepted in that less critical age. Speculations of this kind are now relegated to the department of psychology denominated *epistemology*, and thought is centered upon the relations of the mind, not to the outer world but to the inner world, the brain and nervous system. And in the discussion of this question we seem to



have reached the Leibnitzian stage in which the world is satisfied with the doctrine of a preëstablished harmony. But is it going to remain satisfied with this? I think not.

As the question is one of reasoning from general facts within the possession of all, it is not necessary that one be a great high priest in the science of mind to entitle him to speak with regard to it. While therefore denying to any the right to speak *ex cathedra*, and making no claim to be believed beyond that which belongs to the inherent reasonableness of what I say, I venture to suggest a possible way out of the somewhat humiliating, not to say ridiculous, position in which we seem to be at the present time in relation to the mind problem.

The explanation that I would offer is none other than the simple assumption that the phenomena of mind stand in the same relation to the brain and nervous system that all other phenomena stand to the substances that produce them,—in a word, that the mind is a property of the organized body. The body, organized as it is, with its nervous system and great central ganglion, manifests the properties which it possesses by virtue of its constitution in precisely the same way that all other substances manifest the properties resulting from their inherent nature or constitution. Every substance differs from every other in both its constitution and its properties, and no chemist doubts that the properties of any substance are due to its peculiar constitution; that is to say, the constitution of a substance is the cause of the properties it manifests.

Now, there is an important law governing the properties of substances. It may be briefly formulated by saying that the properties of substances are more active in proportion as their molecular constitution is more complex. The properties of the simpler chemical elements are very inert, those of inorganic compounds are usually much less so, their activities increasing roughly with the degree of composition, and when the organic compounds are reached we find that many of them have very active properties. The law holds for the various grades of organic compounds as we pass from the less to the more complex. The vegetable alkaloids and organic bases that furnish most of the febrifuges, narcotics, and toxics, such as quinine, narcotine, strychnine, etc., are very complex substances and possess relatively large molecules into which carbon, hydrogen, nitrogen, and oxygen all enter.

Another important law of what may be called chemical development, that is, the progress from the simpler to the more complex substances, is that increase in complexity is accompanied by decrease of stability. It is now generally believed that the chief distinction between what are called the chemical elements, which were once supposed to be the ultimate units of matter, and the inorganic compounds, is that the former are so much more stable that, unlike the latter, we are unable, by any means thus far devised, to separate them into any simpler com-

ponents. They may have been formed at a time in the history of the solar system when temperatures prevailed that were higher than can now be artificially produced. Again the distinction between organic and inorganic compounds has broken down all along the line through the artificial production of so many of the latter, formerly supposed to be formed only in the alembic of organic life. But it is here that we find the greatest instability. When we rise above the organic bases of which I have spoken in the degree of chemical complexity, we encounter a group of which the molecules are relatively enormous, so large and complex, indeed, that it often becomes impossible to write their chemical formulas with any degree of certainty. These are the albuminous compounds, and the molecule of albumen itself has been estimated to contain no less than 679 equivalents, which, reduced to the standard of the hydrogen atom, would equal 4,870 of these smallest known chemical units. And now, agreeably to the law stated, we find that the substances of this group are characterized by correspondingly great instability. As a consequence of their exalted structure their molecular activities are far more extensive and varied than those of simpler bodies. One of the principal modes in which they manifest their activities is that which is called *isomerism*, whereby a substance, without any change in the nature or number of its molecules, but by some little-understood rearrangement of them, assumes a different aspect and becomes to all intents and purposes another substance.

I will ask your patience while I very briefly state one additional principle of chemical development, necessary to be understood before we can proceed intelligently. This is what I have called the law of *aggregation or recombining*. It consists simply in the assumption that in the formation of the more complex substances out of the more simple, the molecules of the lower orders enter bodily and as units into the constitution of those of higher ones. That is, they are not, or at least not necessarily, first decomposed into their simpler elements and afterwards combined to form the higher unit, but the units of the next lower order become the elements composing the molecules of the next higher. Without delaying to give examples at the earlier stages of development, we may pass at once to the albuminous compounds and suppose that albumen, with its molecules five thousand times as large as those of hydrogen, is a compound of various forms of proteine, whose molecules are some four hundred times as large as the hydrogen atoms, and that these proteine molecules remain undecomposed and combine to give to albumen the properties that it possesses. But we have reason to believe that from the molecule of hydrogen to that of albumen the process of evolution has been uniformly the same, viz., that of compounding and recombining, of doubly and multiply compounding; in short, it has been the process of molecular aggregation. With still higher states of aggregation, therefore, we should naturally expect still higher forms of activity, still more marked properties.



What properties ought we to expect in a substance formed by the recomponding of the albuminoids? No one could predict. While we may safely predict higher properties from higher degrees of aggregation, we have no basis whatever upon which to predict the nature of these properties. In the simplest chemical re agencies we can not foretell the result. We can not even say which of the three states of matter, the gaseous, the liquid, or the solid, the new compound will exhibit at ordinary temperatures. The invincible solid, carbon, when joined with oxygen, becomes a gas; the type of gases, hydrogen, when combined with another gas, oxygen, results in water, which is a solid at 32° Fahr.; the inert gas, chlorin, combined with the equally inert liquid, mercury, becomes corrosive sublimate, which has very active properties and in no way resembles either of its components. And so we might go through the entire list. The general truth is that chemical union results in a new substance with new properties, different from and of a higher order than those of any which have united to produce it. When the highest known chemical compounds still further combine, we ought therefore to look for something remarkable. When the largest molecules whose constitution can be determined in the laboratory form themselves into higher molecular systems, we should not be surprised if the resultant substance should be an exceedingly strange and important one. The activities of all substances up to this point are molecular, but it might well be that the new compound should possess *molar activities*. At all antecedent stages of chemical development the spontaneous activity is confined to molecules; at this new and higher stage these spontaneous activities may be able to break over these bounds and manifest themselves in the mass.

Now we have a substance—its name is protoplasm—suspected of having the origin indicated, which is capable of such spontaneous movement as a mass. This wonderful property, confined exclusively to this substance, has been given the briefer name *motility*. This astonishing substance, protoplasm, whose existence was not suspected at the beginning of this century, is now known to be an abundant product of nature, to be present in every living thing and in every part of all organic beings if such part is really alive. It is this which makes it alive. Prof. Huxley has happily called it “the physical basis of life.” Not animals alone, but plants as well, have protoplasm in every living cell, and it is as active in the one as in the other. But bound up with this principle of life, and almost as a part of it, protoplasm possesses another and, if possible, still higher property. This property may be fittingly called *awareness*. Its activities are systematic and methodical. They recognize differences in their environment. As Maj. Powell, in his new psychologic terminology, would probably say, they have a “knowledge of good and evil.” In a word, they *feel*. In biologic language, protoplasmic bodies send out *feelers* to explore their environment. Protoplasm is therefore not merely the physical

basis of life, it is the physical basis of mind also, and all nerve tissue which is essentially such, consists of protoplasm in some of its myriad forms. From the strictly material side, protoplasm is the essential thing in life, and it is also the essential thing in mind. There is no other element controlling either vital or psychic phenomena. When this stage of material aggregation was reached evolution ceased along this line. The new line of subsequent development has been that of *organization*, and plants and animals may be regarded simply as mechanisms for the concentration, focalization, and intensification of the inherent powers and properties of protoplasm.

To do justice to this part of the subject would require a separate lecture, but I will ask your attention to a chart\* (Fig. 1) suspended upon the screen, which exhibits a section through the cortex of the cerebrum, regarded by most physiologists and psychologists as the principal organ of consciousness and of mind in general. The little knots with irregular radiating fibers proceeding from them in various directions are the corpuscles of the brain, or brain cells, which are scattered, not wholly without order, through the general mass, from the surface of the convolutions above to the white matter below. The existence of these cells has long been known, but the nature of the thread-like processes which go out from them has only recently been discovered. Not being an anatomist myself, and yet wishing to be altogether correct on such an important point, I shall in what I say relative to these facts chiefly quote, with the permission of Dr. Baker, from an able but as yet unpublished memoir of his, which he has done me the favor to place in my hands.†

"It has long been known that a considerable portion of the cortex is occupied by large cells of a triangular outline, presenting a pointed extremity towards the exterior. These, the pyramidal cells of authors, are of great size in the so-called motor regions of the cortex—that is to say, in the central convolutions. . . . These structures have wide-reaching connections; and Ramón y Cajal, and Van Gehuchten, have much extended our knowledge. . . . It has been noted that there appears to be a direct proportion between the size of a nerve cell and the number and length of its processes. This is justified in the present instance, for there extend from these cells highly complicated processes, some of them of great length. From the apex of the cell a protoplasmic stem passes up through the superficial layers of the cortex and

\* This chart was one prepared by Dr. Frank Baker to illustrate his anatomical lectures. It is an enlargement of one of the excellent figures of Ramón y Cajal in a paper entitled "Sur la Structure de l'Écorce Cérébrale de quelques Mammifères," published in *La Cellule*, vol. VII, pp. 123–176, 3 plates, pl. ii, fig. 7.

Since this lecture was delivered Dr. Baker has published in the *New York Medical Journal* for June 17 and 24, 1893, an exhaustive review of "Recent discoveries in the nervous system," in which he has reproduced many of the most important figures bearing on the subject. Fig. 15 of that paper is the one referred to, and is here borrowed from it. (*New York Medical Journal*, vol. LVII, June 24, 1893, p. 685.)

† Since published as above stated. The passages quoted occur on page 685 of the *New York Medical Journal* for June 24, 1893, in connection with the accompanying figure.



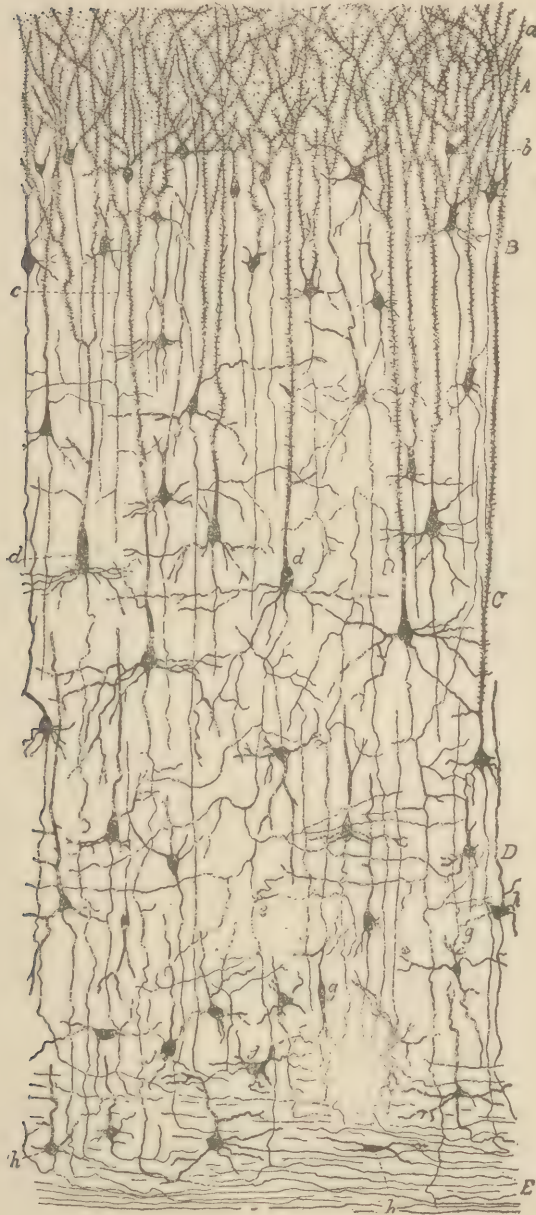


FIG. 1.—Section of the cerebral cortex (Ramón y Cajal). From the supraventricular region of a young mouse. A. Molecular layers. B. Small pyramidal layers. C. Large pyramidal layer. D. Layer of irregular corpuscles. E. White matter. *a*, panicles of the pyramids; *b*, smallest and most superficial of the pyramids; *c*, axis cylinder from a small pyramid; *d*, large pyramid; *e*, its axis cylinder; *f*, cell with ascending axis cylinder; *g*, similar but smaller cells; *h*, cells found in the white matter; *i*, rounded cell that sends its axis cylinder toward the white substance; *j*, cell with short axis cylinder process.

terminates in an arched arborescent panicle, each composed of plume-like expansions barbed with secondary spines. These panicles interlace with each other throughout the superficial layer of the cortex in the most intricate manner, forming a perfect forest of branches which, however, never anastomose with each other. - - - Besides the extraordinary appearance and peculiar situation of these cells there are reasons drawn from embryology and from comparative anatomy that indicate the probability that they are the chief agents in the psychic activity of the cortex. As we ascend the scale from the lower vertebrates to man an increasing complexity of structure is found in these cells, and there is also seen a similar progressive development when the different stages of their growth in the embryo are observed. Ramón y Cajal has therefore given to these structures the name of *psychic cells*.”\*

As Dr. Baker indicates, the Spanish investigator lays it down as a general principle that the farther back we go in the ontogeny of the brain of mammals, that is, the younger the specimen is that is being studied, the fewer and shorter become the protoplasmic expansions, and that the same is true of their phylogeny, that is, as we descend in the scale of organization. It is probable that the failure to discover these important facts before is largely due to the circumstance that early investigations were chiefly confined to the brain of man, or of the most highly developed animals, and at adult stages, in which the processes were much too long to be either successfully traced to their ultimate terminations or brought within the field of the microscope. And I may say that this chart represents a portion of the cerebrum of a mouse at the age of one month. If it requires such a complicated brain structure to conduct the simple psychic activities of so humble a creature, what must be the structure required to conduct the psychic activities of a Newton or a Herbert Spencer?

“As a final synthesis,” says Ramón y Cajal, “it may be affirmed that the human brain owes in great part the superiority of its activity, not only to the considerable number of its elements, but especially to the extraordinary richness of its means of association, that is, to the collateral branches of the axis cylinders, the protoplasmic ramifications, etc.”

It will thus be perceived that in all this we are dealing altogether and essentially with protoplasm and the mechanical means of enabling it to do the maximum work. Brain cells, cellular trunks, lateral branches, plumose denticulations, axis cylinders, all consist chiefly or wholly of protoplasm.

Just as the essential thing in life is spontaneous movement, or motility, so the essential thing in mind is conscious sensibility, or awareness.

\* “Tal es la disposición de la célula piramidal de los mamíferos, de la que podríamos llamar, invocando su especial morfología y su exclusivo yacimiento en la corteza cerebral, *substractum* de las mas elevadas actividades nerviosas, *célula psíquica*.” Ramón y Cajal: Nuevo Concepto de la Histología de los Centros Nerviosos. Revista de Ciencias Médicas de Barcelona (reprint from vol. XVIII, Barcelona, 1893, p. 27).



Upon these as foundations the body and mind, respectively, of all living things, including man, have been built up by the organizing powers of nature. We are now only concerned with the latter, and the object in tracing these initial steps has been to show as clearly as possible wherein the great "mystery of mind" lies, about which, as shown by the passages I have quoted, the scientific world seems to be so greatly exercised. It was proposed to inquire as to the necessity for laying so great stress upon the admitted fact that we do not and perhaps never shall understand the relation that subsists between mind and body, between psychosis and neurosis, between states of brain and states of consciousness. If the progress of development has been anything analogous to what I have outlined, if mind is a property of organized protoplasm, or if any such relation subsists between mind and body as subsists between substances and their properties, then the question at once arises whether the great "mystery" has been located at the right place, and whether it would not be much more logical to locate it farther down in the scale of development, and not confine it to this one highest stage. For we are obliged to confess, with the same abject humility as we confess our ignorance of mind, that the simplest properties of the humblest forms of matter are utterly inexplicable. We know just as much about why nerves feel and brain thinks as we do about why sugar is sweet or lead heavy. Even the simplest of all physical phenomena, those of gravitation, are utterly unknown to man except as observed facts and formulated laws. He is still as ignorant of why an apple falls to the ground as he is of why he can remember that he saw it do so. Prof. James, in commenting upon Prof. Ladd's views respecting memory, says, after quoting a passage from the well-known work of the latter:

"This passage seems to me characteristic of the reigning half-way modes of thought. It puts the difficulties in the wrong places. . . . The result is various confused and scattered mysteries and unsatisfied intellectual desires. But why not 'pool' our mysteries into one great mystery, the mystery that brain-processes occasion knowledge at all?"\*

I would go much further than Prof. James, and say that not only Prof. Ladd but himself as well, and nearly all those who have expressed themselves on the subject, "put the difficulties in the wrong places." And I would also go much further than he in the direction of "pooling" the mysteries. The great mystery is not merely "that brain-processes occasion knowledge," or that nerve vibrations occasion feeling, but that molecular activities should occasion any of the properties that bodies present. It is not mind alone, but matter also and equally, whose ways are beyond our powers. We can paraphrase every one of the sayings of the great men that I have quoted. Alongside of Tyndall's remark that "the passage from the physics of the brain to the corresponding facts of consciousness is unthinkable," we can put the parallel truth that the

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\* Principles of Psychology, vol. 1, pp. 688, 689.

passage from the constitution of matter to the corresponding properties of matter is unthinkable. When Spencer asks, "Can the oscillation of a molecule be represented in consciousness side by side with a nervous shock and the two be recognized as one?" we may with equal propriety ask: Can the oscillation of an atom be represented in consciousness side by side with a magnetic attraction and the two be recognized as one? Prof. LeConte's brilliant comparison of psychic phenomena to the genii that spring forth when the lamp of Aladdin is rubbed is equally applicable to any kind of physical phenomena. And I fail to see why Prof. James's epigram, "motion became a feeling" is any more absurd than it is to say, "a motion became a color." Yet modern science teaches that light, which embraces all color, is "a mode of motion."

But are we, after all, so profoundly ignorant of the underlying principles of nature as all this would imply? Do we, then, know nothing of forces, and properties, and causes?

There is, it is true, a school of philosophers, the positivists, who insist that all investigation into the causes of things is wasted labor, and that science progresses solely through the study of phenomena and their laws. Comte, the founder of this school, taught that all we know or can ever hope to know is the relations that events sustain to one another; that what we call cause and effect is simply succession. There is much truth in this, but the stress which positivists lay upon the laws of phenomena contains within itself an admission of all that anyone need claim, the admission, namely, that the succession of which they speak is an orderly succession, that sequences follow antecedents in a uniform and invariable manner, so uniform and invariable that they can be depended upon absolutely; otherwise it would be impossible to arrive at any laws, and there would be no such thing as science. But this is what is meant by cause and effect. When this regular and orderly sequence is known the causes are known, i. e., the proximate causes, and all causes, however far we may trace them back, are necessarily proximate, for every cause is itself the effect of an antecedent cause, and every effect is the cause of a subsequent effect. So long, then, as the succession is perfectly invariable it is, to all intents and purposes, a succession of cause and effect, and no one claims that the series can be traced to its origin or its termination; for every series is infinite. And this is all there is of the mystery, and the ostentatious confession that scientific men make is nothing more than the confession that they are finite beings.

But the forces of nature *are* uniform and reliable. The properties of matter *are* always the same for the same substance. Bodies manifesting the same properties must be of the same internal constitution—must be the same substance. "Show me," said Bacon, "a substance that hath all the properties of gold, and let fools contend whether it be



gold or no." Not less is this true of the brain and nervous system in their relations to thought and feeling. The laws of mind are as uniform and invariable as the laws of matter.\* They are the laws of matter in its most highly developed form. The relation of brain-states to states of consciousness are not accidental and haphazard relations. They are rigidly fixed and invariable relations. The former are therefore the uniform antecedents and true proximate causes of the latter, and so far as we know these relations we really know the cause of mind.

I have endeavored to show that the prevailing fashion among scientific men of emphasizing the so-called "mystery of mind" is unnecessary and illogical, since mind is no more a mystery than matter, and that all that there is any ground for confessing is that, in consequence of the greater complexity of mental phenomena, due to the higher state of development of the material basis of mind, we possess as yet much less knowledge of them than we do of many of the simpler phenomena of nature. This habit can be nothing better than a relic of the old preconception in favor of the essential dignity of mind which went along with the notion of the essential unworthiness of matter—a preconception grounded in hypocrisy, in that it sought to cloak under a show of humility the egotistical pretension to divine attributes. It is therefore altogether unworthy of those who profess to be in search of truth solely for truth's sake.

I promised that I would also consider the desirability or advisability of assuming this attitude, considered independently, so far as this was possible, of its logical tenability. Of course, if the position is not a sound one this also at once condemns it from the point of view of advisability; but waiving that point, let us consider for a moment a few of the consequences to which it naturally leads. It is a well-known characteristic of the human mind to love the marvellous, to feast on the magical and occult, to hug delusions, to prefer the improbable and mysterious, and not merely to believe the impossible, but to believe it because it is impossible. The motto of science is *nil admirari* (wonder at nothing). And in the face of this known quality of the human mind it behooves men of science to guard themselves firmly against feeding this popular appetite for magic and superstition. But the moment the possibility is conceded that mind or any part of mind can have an existence separate from and independent of body, the door is opened for the crudest theories, the wildest speculations, and the most unbridled fantasies. Encouraged by such utterances as I have quoted from men of science, there has already come forward into prominence what claims to be a "science" founded on the essential autonomy of mind, and the wonder-loving public is rallying to it as though the salvation of the race depended upon it. We hear much of "thought transference" or "telepathy," and the claim is openly made that "the action of one mind upon another independently of the recognized channels of

sense" has been experimentally established. Far more astonishing things than this, indeed, as you all know, are now boldly claimed in the name of science. They are all based on the assumption that the mind, or something that must be embraced under any proper definition of mind, since it is no part of the body, is capable of cutting loose from its corporeal belongings and proceeding through space, exerting force upon material objects and taking possession of other bodies. Those who claim to be "investigating" such alleged facts, or at least most of them, proceed upon a principle the exact reverse of that by which all experimental science advances. Instead of making truth the end, and employing hypothesis as an instrument for guiding them to the truth, they make their hypothesis the end, and conduct their experiments with a view to finding some support, however slender, for their hypothesis. I need not tell you that nothing that the scientific world will accept as proof that any of these phenomena take place has ever been brought forward, and my only purpose in referring to the subject is to show the utter chaos into which the admission of the possibility of such things would plunge the whole science of mind.

The phenomena of mind must be investigated according to the same principles and by the same methods as other classes of phenomena; and this is what is actually being done by the modern school of experimental psychologists. And even at this early stage we are beginning to see what is likely to prove the basis of all the error that prevails and has always prevailed respecting the mind. Fundamentally, of course, it is due to ignorance of what the mind is, chiefly to the false belief in its independence of the body, but more particularly it rests upon the failure until recently to discover the true nature of consciousness, i. e., of the central or controlling principle of mind, that which makes every individual distinctively himself and no one else. In the great majority of cases this supreme authority is something fixed for each individual and permanently connected with his individuality during the whole of his life. But it is now beginning to be seen that this is far from being universally true, and the cases of "double consciousness" that have been dwelt upon so much of late, bewildering as they are to the unphilosophical, have furnished the key to the solution of the greater part of the mysteries that have beset the study of mind. It is now seen that hypnotism belongs to the same class, and that self-hypnotism, or so-called mediumship, where it is genuine, is simply a case of temporary double consciousness. And between this and the familiar fact of "unconscious cerebration" all the intervening steps can be traced. The influence of "expectancy" and the laws governing hallucinations are also becoming understood, and we seem to be in the way of ultimately explaining on scientific principles most of the psychic phenomena that have so long seemed miraculous.



Some there are, I presume, who will look upon the scientific explanation of mind which I have endeavored to bring forward as *materialistic*. If to posit a material basis for the phenomena of mind be materialism it were useless to attempt to evade the charge. But in these days of the apotheosis of matter this charge is without force for those who possess any considerable acquaintance with the material world. If however the term materialism be employed in its only proper and legitimate sense as postulating the material nature of mind itself, the scientific conception of mind is the farthest remove possible from a materialistic conception. The antithesis between matter and property is absolute. Mere attributes are in the clearest sense of the word *immaterial*, and mind is simply an attribute. From this point of view it would be as reasonable to say that love, or honesty, or justice, or liberty were material things as to say that feeling and thought are such.

If, on the other hand, we glance at the theory of mind that stands opposed to the scientific view it is difficult to see how the charge of materialism can be escaped. If there is an element—call it mind, thought, soul, spirit, or what not—that can detach itself from the personality to whom it normally belongs, and pass into another body, or remain in space performing mechanical operations upon material objects, it matters not whether it be visible or invisible, or whether it can appeal in any way directly to sense or not, such a thing possesses the nature of a material body, as much so as the invisible atmosphere, the rarer gases, or the vastly more tenuous aether that vibrates to so great purpose against the retina of the eye. Turn it as you will, twist it as you may, matter can only be affected by matter, and the impact of moving matter against other matter is, in the last analysis, the essence of force. And this is true of the method which mind itself employs. Thought and feeling in and of themselves are powerless. They can only act through a motor system which uniformly and necessarily accompanies the sensor system, which transfers molecular nerve vibrations to the muscles, transforms them into molar motions, and communicates them mechanically to the world without. It is this that we mean by the term *expression*, whether it be of emotions or of ideas. It is thus that you are able to sit where you are and learn what my thoughts are. If I were merely to stand here and think my thoughts the nearest of you would gain no intimation of the nature of those thoughts.

This view of mind has all the promise of a true science. Mind is a great power in the world. It has wrought mighty changes in the past and is destined to work still mightier ones in the future. And an experimental psychology is destined to place the laws of mind within the grasp of man, even as experimental physics and chemistry have placed the laws of matter within his power. The opposite view, which no one will complain if I characterize as ontological, and which I have

shown to be essentially materialistic, merely represents the alchemy of mind. The so-called "psychical researchers" are simply searching for the philosopher's stone. The same class have always been seeking it, and until late in the present century the whole domain of mind was in its pre-Baconian and medieval stage. The baser metals of mind will be transformed into gold by the new science of psychology in the same way that those of matter were transformed by chemistry, and if the race of psychic alchemists who think that gold alone has value are disappointed, the rest of the world will rejoice, as it always rejoices when science triumphs over magic.





